

REMARKS

The Final Office Action mailed September 4, 2003, has been received and reviewed.

Claims 1 through 3, 5 through 41 and 43 through 55 are currently pending in the application. Claims 1 through 3, 5 through 41 and 43 through 55 stand rejected.

Reconsideration of the above-referenced application is respectfully requested.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Kim et al. (U.S. Patent No. 6,004,867) in view of Lin (U.S. Patent No. 5,258,648)

Claims 1 through 3, 5 through 10, 15, 18, 19, 21, 22, 26 through 28, 30 through 36, 43, 44 and 50 through 52 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim et al. (hereinafter “Kim”) (U.S. Patent No. 6,004,867) in view of Lin (U.S. Patent No. 5,258,648). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1 through 3, 5 through 10, 15, 18, 19, 21, 22, 26 through 28, 30 through 36, 43, 44 and 50 through 52 are improper because a *prima facie* case of obviousness cannot be established against any of independent claims 1, 21 or 43.

While Kim discloses that conductive traces may be located **in** the substrate (col. 3, line 55) or at a surface of the substrate which is to be disposed **against** the semiconductor die (FIGS. 1 and 2), Kim does not teach or suggest that the conductive traces may be carried on an

opposite surface (*i.e.*, a surface of the substrate that is opposite from the surface which is disposed against the semiconductor die). (*See, Final Office Action* of September 4, 2003, page 3).

Lin discloses a composite flip chip semiconductor device, which refers to a package-less semiconductor device. (col. 1, lines 28-31). The size of the device is kept to a minimum since the device does not employ a traditional package body. (col. 1, lines 52-54). Conductive traces of the interposer of Lin are carried on a surface of an interposer 22 which is to be coupled to the active surface of the semiconductor die. (FIG. 1).

Applicant respectfully submits that the combination of Kim with Lin does not teach or suggest each and every element of claim 1 as required to establish a *prima facie* case of obviousness. Independent claim 1 is directed to a chip-scale package which includes a semiconductor device and a substrate disposed adjacent an active surface of the semiconductor device. The substrate comprises a semiconductor material. At least one electrically conductive via extends at least partially through the substrate and is positioned over the semiconductor device. The at least one electrically conductive via further communicates with a corresponding bond pad of the semiconductor device. At least one conductive trace is in communication with the at least one conductive via and is carried on a surface of the substrate that is opposite from the surface of the substrate that is adjacent to the semiconductor device.

The semiconductor device of Lin is packaged in a composite flip chip semiconductor device and attached to an interposer that is attached to a substrate. The semiconductor device of Kim is packaged in a chip scale package that is attached to a substrate. The interposer of Lin and the substrate of Kim are different in both structure and function. Accordingly, a resultant combination of a conductive trace of the interposer of Lin with the substrate of Kim does not teach or suggest each and every element of claim 1 as required to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Since the combination of Kim with Lin does not teach or suggest each and every element of claim 1, a *prima facie* case of obviousness cannot be established under 35 U.S.C. § 103(a).

A *prima facie* case of obviousness also cannot be established since no suggestion or motivation exists to combine the interposer of the composite flip chip semiconductor device of

Lin with the semiconductor device of the chip-scale package of Kim. The Final Office Action indicates “it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate at least one conductive trace in communication with at least one electrically conductive via, the trace being carried on a surface of the substrate which is opposite from the surface adjacent to the device as taught by Lin so that the desired routing for the vias and power/ground connections for the terminals/solder balls can be achieved in Kim et al’s package.” (Final Office Action at page 4).

It appears that the Office is using a hindsight reconstruction of the applicant’s invention to formulate the obviousness rejection instead of using a suggestion or motivation in the prior art to combine Kim with Lin. As stated by the Federal Circuit “the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis in rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.” (*In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1619 (Fed. Cir. 1999). Further, when the patentability of a claimed invention is based on the combination of two elements, “the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.” (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984).

Neither Kim nor Lin, when viewed as a whole, would have suggested or motivated one of ordinary skill in the art would to place a conductive trace of the interposer from Lin on the surface of the substrate that is opposite the semiconductor device of Kim in order to arrive at the chip-scale package of claim 1. As stated in Kim “[t]he electrically conductive traces 122 can be freely patterned **in** the substrate 120.” (col. 3, lines 16-17) (emphasis added). Kim et al. further states “after the substrate 320 is firmly attached to the wafer 300, a substrate-wafer-composite 390 is formed. The top surface of the substrate 320 is back-lapped so that the terminal pads 324 **in** the substrate 320 are exposed.” (col. 6, lines 16-21; *see also*, FIG. 5D) (emphasis added). Thus, the traces formed **in** the substrate of Kim allow the top surface of the substrate to be back-lapped after the substrate is attached to the wafer. If the conductive traces were formed **on** the top surface of the substrate as suggested in the Final Office Action, then the top surface of the substrate of Kim would not be suited for back-lapping since the conductive traces would be

removed. Further, the conductive traces in the substrate of Kim perform the function of routing the vias to other electrical connections; adding traces to the surface would increase the cost to manufacture the devices, which is contrary to an object of Kim. (*See*, col. 1, lines 49-51). Thus, without a suggestion or motivation to combine the cited references, a *prima facie* case of obviousness cannot be established under 35 U.S.C. § 103(a).

Accordingly, it is respectfully submitted that independent claim 1 is allowable over the combination of Kim and Lin because any combination of such prior art, at the very least, does not teach or suggest all of the elements of claim 1 as required to establish a *prima facie* case of obviousness. Further, the lack of a suggestion or motivation to combine Kim with Lin precludes the establishment of a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Claims 2, 3, 5 through 10, 15, 18 and 19 are each allowable, at the very least, as depending from nonobvious, independent claim 1, which is allowable. (*See, In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)).

Independent claim 21 is directed to a chip-scale package with a substrate having a first surface with contact areas corresponding to an arrangement of bond pads on a semiconductor device to be assembled therewith. The substrate further includes a second surface with at least one conductive trace thereon. Since a combination of a conductive trace of the interposer of Lin with the substrate of Kim does not teach or suggest each and every element of claim 21, a *prima facie* case of obviousness cannot be established under 35 U.S.C. § 103(a).

Further, since the substrate of Kim, once attached to the semiconductor device, is back-lapped on the surface opposite the semiconductor device rather than having a conductive trace placed thereon, no suggestion or motivation exists to combine the disclosure of Kim with Lin as required to establish a *prima facie* case of obviousness of claim 21 under 35 U.S.C. § 103(a).

Thus, independent claim 21 is allowable over the combination of Kim and Lin because a combination of such prior art, at the very least, does not teach or suggest each and every element of claim 21 as required to establish a *prima facie* case of obviousness. Further, since no suggestion or motivation exists to combine Kim with Lin, a *prima facie* case of obviousness cannot be established under 35 U.S.C. § 103(a).

Claims 22, 26 through 28 and 30 through 36 are each allowable, at the very least, as depending from nonobvious, independent claim 21, which is allowable. (*See, In re Fine, supra*).

Turning now to independent claim 43, it is directed to a carrier with at least one via that extends from a first surface of the carrier, adjacent to which a semiconductor device is to be positioned, to a second surface of the carrier. At least one conductive trace that extends laterally from an end of the via is carried by the second surface of the carrier. A *prima facie* case of obviousness cannot be established under 35 U.S.C. § 103(a) since a combination of a conductive trace of the interposer of Lin with the substrate of Kim does not teach or suggest each and every element of claim 43.

Further, no suggestion or motivation exists to combine the disclosure of Kim with Lin as required to establish a *prima facie* case of obviousness with regard to claim 43 under 35 U.S.C. § 103(a) since the surface of the substrate opposite the semiconductor device of Kim is back-lapped. The back-lapping of the substrate prevents a desire to place a conductive trace thereon.

Accordingly, independent claim 43 is allowable over Kim and Lin because no suggestion or motivation exists to combine the cited references and even if the references were combined, the combination of the cited references does not teach or suggest each and every element of claim 43 as required to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Claims 44 and 50 through 52 are allowable, at the very least, as depending from nonobvious independent claim 43. (*See, In re Fine, supra*).

Obviousness Rejections Based on Kim (U.S. Patent No. 6,004,867) and Lin (U.S. Patent No. 5,258,648) as applied to claims 1, 21 and 43 above, and further in view of Gnadinger (U.S. Patent No. 5,229,647)

Claims 11 through 14, 20, 23 through 25, 37 through 41 and 45 through 49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim (U.S. Patent No. 6,004,867) and Lin (U.S. Patent No. 5,258,648) as applied to claims 1, 21 and 43 above, and further in view of Gnadinger (U.S. Patent No. 5,229,647). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 11 through 14 and 20 are each allowable, at the very least, as depending directly or indirectly from nonobvious independent claim 1. (*See, In re Fine, supra*).

Claims 23 through 25 and 37 through 41 are each allowable, at the very least, as depending directly or indirectly from nonobvious independent claim 21. (*See, In re Fine, supra*).

Claims 45 through 49 are each allowable, at the very least, as depending directly or indirectly from nonobvious independent claim 43. (*See, In re Fine, supra*).

Applicant further submits that a *prima facie* case of obviousness under 35 U.S.C. § 103(a) cannot be established with regard to claims 11 through 14, 20, 23 through 25, 37 through 41 and 45 through 49 since no suggestion or motivation exists to combine Gnadinger with Kim or Lin. Gnadinger, which discloses wafers having vias extending completely therethrough, is, like Kim and Lin, silent on the use of conductive traces on the surfaces of the wafers that are to be located opposite a semiconductor device. Thus, a *prima facie* case of obviousness cannot be established for any of claims 11 through 14, 20, 23 through 25, 37 through 41 and 45 through 49 under 35 U.S.C. § 103(a).

Obviousness Rejection Based on Kim. (U.S. Patent No. 6,004,867) and Lin (U.S. Patent No. 5,258,648) as applied to claims 1, 21 and 43 above, and further in view of Higgins, III (U.S. Patent No. 6,294,405)

Claims 16, 17, 29 and 53 through 55 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim (U.S. Patent No. 6,004,867) and Lin (U.S. Patent No. 5,258,648) as applied to claims 1, 21 and 43 above, and further in view of Higgins, III (U.S. Patent No. 6,294,405). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 16, 17, 29 and 53 through 55 are each allowable, at the very least, as depending from one of independent, nonobvious claims 1, 21 or 43, each of which is allowable. (*See, In re Fine, supra*).

Higgins discloses a sub-chip-scale package having a substrate electrically connected to a semiconductor device, but, like Kim and Lin, lacks any teaching or suggestion of conductive traces on a surface of the substrate that is opposite the semiconductor device and, thus, the resultant combination of Higgins with Kim and Lin does not remedy the aforementioned

deficiencies of Kim and Lin as required to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Thus, a *prima facie* case of obviousness cannot be established for any of claims 16, 17, 29 and 53 through 55 under 35 U.S.C. § 103(a).

In view of the foregoing remarks, reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejections of claims 1 through 3, 5 through 41 and 43 through 55 are requested.

ENTRY OF AMENDMENTS

Each of the proposed amendments to claims 1, 3, 5 through 20, 22 through 29, 31 through 41, and 43 through 55 merely replaces the term “said” with “the.” Therefore, none of the proposed claim amendments alters the scope of any of the claims of the above-referenced application.

Claims 2 and 30 have been amended to include subject matter similar to that recited in claim 51.

It is proposed that claim 21 be amended to replace the term “through” with “with,” which does not change the scope of claim 21, but more clearly indicates that the bond pads communicate with corresponding conductive vias.

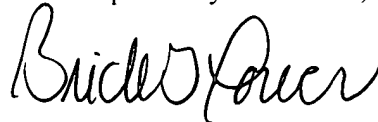
It is respectfully submitted that the proposed amendments to the claims of the above-referenced application should be entered because none of the proposed amendments introduces new matter into the above-referenced application or would require an additional search.

In the event that the proposed amendments are not entered, entry thereof upon the filing of a Notice of Appeal in the above-referenced application is respectfully requested.

CONCLUSION

Claims 1 through 3, 5 through 41 and 43 through 55 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Brick G. Power". The signature is fluid and cursive, with the first name "Brick" being more prominent.

Brick G. Power
Registration No. 38,581
Attorney for Applicant
TRASKBRITT
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

Date: November 4, 2003
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